FCC TEST REPORT

FOR

Shenzhen Lenkeng Technology Co., Ltd

IR signal wireless extender

Test Model: LKV388IR-915

Additional Model No.: LKV388IR-909, LKV388IR-921

Prepared for	:	Shenzhen Lenkeng Technology Co., Ltd
Address	:	West 4F,Jinguangxia Culture&Tech Park, 3 Guangxia Road, Shenzhen 518049, China
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample	:	May 25, 2018
Number of tested samples	:	1
Sample number	:	Prototype
Date of Test	:	May 25, 2018~November 20, 2018
Date of Report	:	November 21, 2018

FCC TEST REPORT
FCC CFR 47 PART 15 C(15.249)

Report Reference No. ..... :		**LCS180525011AEA**
Date of Issue.....	:	November 21, 2018
Testing Laboratory Name ..... :		**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address.....	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure.....	:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name..... :		**Shenzhen Lenkeng Technology Co., Ltd**
Address.....	:	West 4F,Jinguangxia Culture&Tech Park, 3 Guangxia Road, Shenzhen 518049, China
Test Specification		
Standard	:	FCC CFR 47 PART 15 C(15.249) / ANSI C63.10: 2013
Test Report Form No.	:	LCSEMC-1.0
TRF Originator	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF.....	:	Dated 2011-03

Test Item Description. ..... :		**IR signal wireless extender**
Trade Mark.....	:	LENKENG
Test Model	:	LKV388IR-915
Ratings.....	:	DC 5V/100mA by Power adapter or PC USB port
Result ..... :		**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Calvin Weng	Leo Lee	Gavin Liang
Calvin Weng/ Administrators	Leo Lee/ Technique principal	Gavin Liang/ Manager

FCC -- TEST REPORT

Test Report No. : **LCS180525011AEA**	November 21, 2018 Date of issue

Test Model.....	:	LKV388IR-915
EUT.....	:	IR signal wireless extender
Applicant.....	**:**	**Shenzhen Lenkeng Technology Co., Ltd**
Address.....	:	West 4F,Jinguangxia Culture&Tech Park, 3 Guangxia Road, Shenzhen 518049, China
Telephone.....	:	/
Fax.....	:	/
Manufacturer.....	**:**	**Shenzhen Lenkeng Technology Co., Ltd**
Address.....	:	West 4F,Jinguangxia Culture&Tech Park, 3 Guangxia Road, Shenzhen 518049, China
Telephone.....	:	/
Fax.....	:	/
Factory.....	:	**Shenzhen Lenkeng Technology Co., Ltd**
Address.....	:	West 4F,Jinguangxia Culture&Tech Park, 3 Guangxia Road, Shenzhen 518049, China
Telephone.....	:	/
Fax.....	:	/

Test Result	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
000	November 21, 2018	Initial Issue	Gavin Liang

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1 Description of Device (EUT)

EUT	:	IR signal wireless extender
Model Number	:	LKV388IR-915
Additional Model Number	:	LKV388IR-909, LKV388IR-921
Model Declaration	:	All the PCB and PCB components are identical with each other, except the model name is different, so no additional models are tested.
Power Supply	:	DC 5V/100mA by Power adapter or PC USB port
Frequency Range	:	909MHz-921MHz(909MHz, 915 MHz, 921MHz)
Modulation Technology	:	ASK
Channel Number	:	3 channels
Antenna Gain	:	External antenna, 0dBi (Max.)

1.2 Support equipment List

Manufacturer	Description	Model	Serial Number	Certificate
MASS POWER	Power Adapter	NBS05B050100VU	--	FCC VOC

1.3 External I/O

I/O Port Description	Quantity	Cable
DC in port	1	1.6m unshielded cable
IR in port	1	1m unshielded cable

1.4 Description of Test Facility

FCC Registration Number. is 254912.

Industry Canada Registration Number. is 9642A-1.

ESMD Registration Number. is ARCB0108.

UL Registration Number. is 100571-492.

TUV SUD Registration Number. is SCN1081.

TUV RH Registration Number. is UA 50296516-001

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10:2013 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

1.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

1.6. Measurement Uncertainty

Test Item		Frequency Range	Uncertainty	Note
Radiation Uncertainty	:	9KHz~30MHz	±3.10dB	(1)
		30MHz~200MHz	±2.96dB	(1)
		200MHz~1000MHz	±3.10dB	(1)
		1GHz~26.5GHz	±3.80dB	(1)
		26.5GHz~40GHz	±3.90dB	(1)
Conduction Uncertainty	:	150kHz~30MHz	±1.63dB	(1)
Power disturbance	:	30MHz~300MHz	±1.60dB	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.7 Description of Test Modes

The following operating modes were applied for the related test items.

All test modes were tested, only the result of the worst case was recorded in the report.

Mode of Operations	Frequency Range (MHz)
ASK	909, 915, 921
For Conducted Emission	
Test Mode	TX Mode
For Radiated Emission	
Test Mode	TX Mode

Worst-case mode and channel used for 150 KHz-30 MHz power line conducted emissions was the mode and channel with the highest output power that was determined to be TX-915MHz.

Worst-case mode and channel used for 9 KHz-1000 MHz radiated emissions was determined to be TX-915MHz.

***Note: Using a temporary antenna connector for the EUT when conducted measurements are performed.

Pre-test AC conducted emission at both voltage AC 120V/60Hz and AC 240V/50Hz, recorded worst case.

Pre-test AC conducted emission at both power adapter and charge from PC mode, recorded worst case.

2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10: 2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd.

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 and 15.249 under the FCC Rules Part 15 Subpart C.

2.3. General Test Procedures

1.1.1.2.3.1 Conducted Emissions

The EUT is directly placed on the ground. According to the requirements in Section 6.2.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

1.1.2.2.3.2 Radiated Emissions

The EUT is placed on a turntable, which is directly placed on the ground. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10-2013

3. CONNECTION DIAGRAM OF TEST SYSTEM

3.1. Justification

The system was configured for testing in a continuous transmit condition. Continuous transmitting was pre-programmed. It'll keep transmitting with modulated signal at the lowest channel when powered on. When press the "Lock ID" button, it'll move to the middle channel. Repeat press it again, it'll trans mitting at the high channel used.

3.2. EUT Exercise Software

It'll move to the middle channel. Repeat press it again, it'll transmitting at the high channel used.

3.3. Special Accessories

No.	Equipment	Manufacturer	Model No.	Serial No.	Length	shielded/ unshielded	Notes
1	PC	Lenovo	Ideapad	A131101550	/	/	DOC
2	Power adapter	Lenovo	CPA-A090	36200414	1.00m	unshielded	DOC

3.4. Block Diagram/Schematics

Please refer to the related document

3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

3.6. Test Setup

Please refer to the test setup photo.

4. SUMMARY OF TEST RESULTS

Applied Standard: FCC Part 15 Subpart C §15.249		
FCC Rules	**Description Of Test**	**Result**
§15.203	Antenna Requirement	Compliant
§15.207(a)	Power Line Conducted Emissions	Compliant
§15.205(a), §15.209(a), §15.249(a), §15.249(c)	Radiated Emissions Measurement	Compliant
§15.249 (d)	Band Edges Measurement	Compliant
§2.1049	99% and 20 dB Bandwidth	Compliant

5. ANTENNA REQUIREMENT

5.1. Standard Applicable

According to § 15.203 and RSS-Gen, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

5.2. Antenna Connected Construction

The EUT use external R-SMA antenna and maximum antenna gain is 0dBi, meets FCC Part §15.203 antenna requirement. Please see EUT photo for details.

5.3. Results

Compliance

6. POWER LINE CONDUCTED EMISSIONS

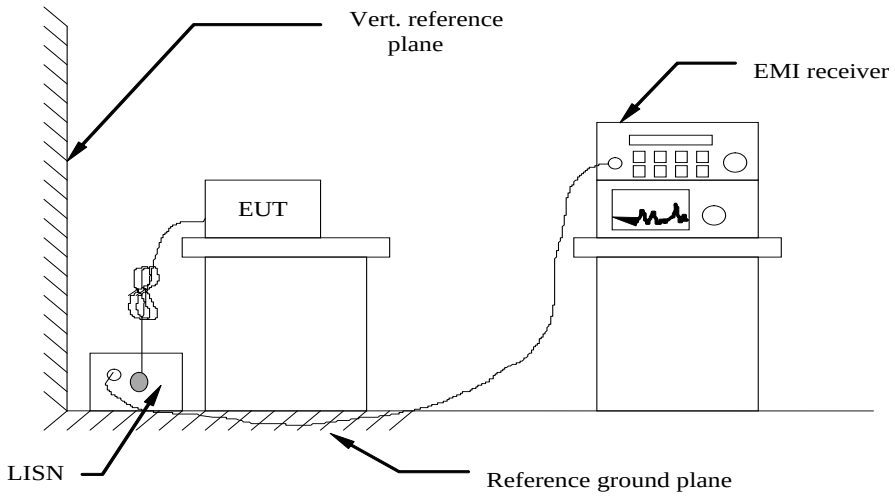
6.1. Standard Applicable

According to §15.207 (a) & RSS-Gen § 8.8: For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range are listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

* Decreasing linearly with the logarithm of the frequency

6.2. Block Diagram of Test Setup



6.3. Test Results

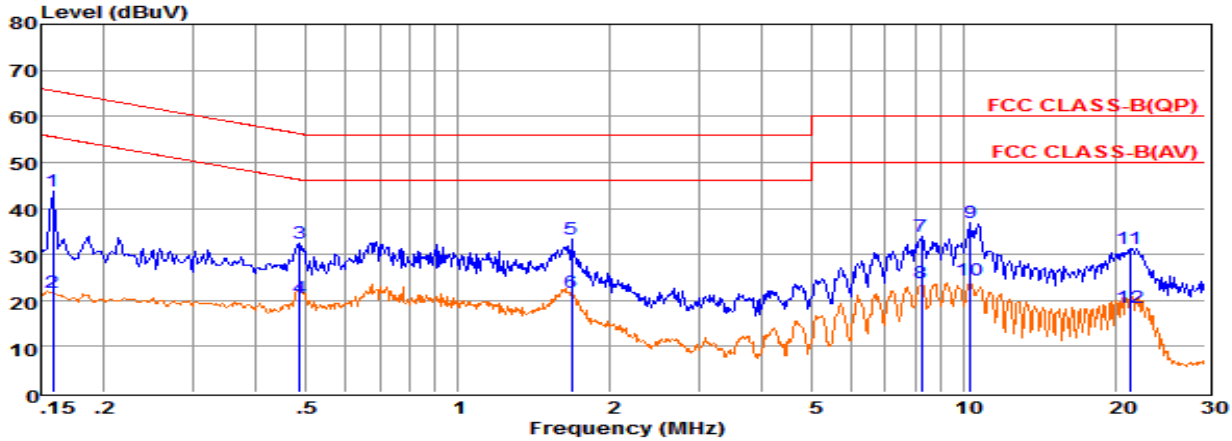
PASS

Please refer to following pages for test plots;

.

AC Conducted Emission of power adapter @ AC 120V/60Hz @ TX (worst case)

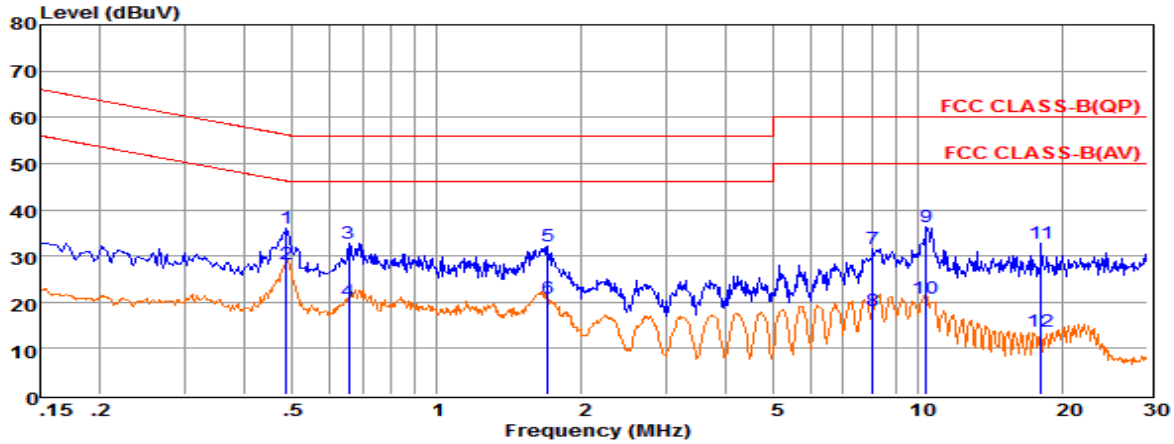
Line



	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.16	23.97	9.58	0.02	10.00	43.57	65.56	-21.99	QP
2	0.16	2.09	9.58	0.02	10.00	21.69	55.55	-33.86	Average
3	0.49	12.75	9.62	0.04	10.00	32.41	56.23	-23.82	QP
4	0.49	0.77	9.62	0.04	10.00	20.43	46.23	-25.80	Average
5	1.68	13.67	9.64	0.05	10.00	33.36	56.00	-22.64	QP
6	1.68	1.99	9.64	0.05	10.00	21.68	46.00	-24.32	Average
7	8.24	14.10	9.68	0.07	10.00	33.85	60.00	-26.15	QP
8	8.24	3.95	9.68	0.07	10.00	23.70	50.00	-26.30	Average
9	10.29	17.17	9.69	0.08	10.00	36.94	60.00	-23.06	QP
10	10.29	4.58	9.69	0.08	10.00	24.35	50.00	-25.65	Average
11	21.26	11.35	9.73	0.12	10.00	31.20	60.00	-28.80	QP
12	21.26	-1.43	9.73	0.12	10.00	18.42	50.00	-31.58	Average

Remarks: 1. Measured = Reading + LISNFac + Cable Loss + Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

Neutral



	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.49	16.41	9.62	0.04	10.00	36.07	56.23	-20.16	QP
2	0.49	8.73	9.62	0.04	10.00	28.39	46.23	-17.84	Average
3	0.66	13.14	9.63	0.04	10.00	32.81	56.00	-23.19	QP
4	0.66	0.54	9.63	0.04	10.00	20.21	46.00	-25.79	Average
5	1.70	12.34	9.63	0.05	10.00	32.02	56.00	-23.98	QP
6	1.70	1.06	9.63	0.05	10.00	20.74	46.00	-25.26	Average
7	8.06	11.79	9.70	0.07	10.00	31.56	60.00	-28.44	QP
8	8.06	-1.55	9.70	0.07	10.00	18.22	50.00	-31.78	Average
9	10.40	16.56	9.72	0.08	10.00	36.36	60.00	-23.64	QP
10	10.40	0.96	9.72	0.08	10.00	20.76	50.00	-29.24	Average
11	18.04	12.80	9.81	0.11	10.00	32.72	60.00	-27.28	QP
12	18.04	-6.24	9.81	0.11	10.00	13.68	50.00	-36.32	Average

Remarks: 1. Measured = Reading + LISNFac + Cable Loss + Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

****Note: Pre-scan all modes and recorded the worst case results in this report.*

7. RADIATED EMISSION MEASUREMENT

7.1. Standard Applicable

According to FCC § 15.249: Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) and 15.249 limit in the table below has to be followed.

Fundamental Frequency	Field Strength of fundamental (millivolts/meter)	Field Strength of harmonics (microvolts/meter)
902-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

According to RSS-210 B.10:

The field strength of fundamental and harmonic emissions, measured at 3 m, shall not exceed 50 mV/m and 0.5 mV/m respectively.

The field strength limits shall be measured using an average detector, except for the fundamental emission in the frequency band 902-928 MHz, which is based on measurements using an International Special Committee on Radio Interference (CISPR) quasi-peak detector.

Emissions radiated outside of the specified frequency bands, except for harmonic emissions, shall be attenuated by at least 50 dB below the level of the fundamental emissions or to the general field strength limits listed in RSS-Gen, whichever is less stringent.

7.2. Instruments Setting

Please refer to equipment list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10^{th} carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB/VB 200Hz/1KHz for QP/AVG
Start ~ Stop Frequency	150kHz~30MHz / RB/VB 9kHz/30KHz for QP/AVG
Start ~ Stop Frequency	30MHz~1000MHz / RB/VB 120kHz/1MHz for QP

7.3. Test Procedure

1) Sequence of testing 9 kHz to 30 MHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions.

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna height is 0.8 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

--- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

2) Sequence of testing 30 MHz to 1 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 3 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

3) Sequence of testing 1 GHz to 18 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height scan range is 1 meter to 2.5 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.

--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

4) Sequence of testing above 18 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 1 meter.

--- The EUT was set into operation.

Premeasurement:

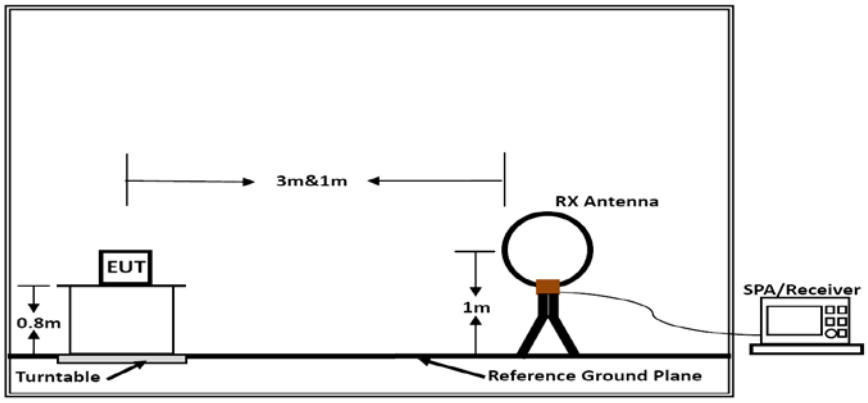
--- The antenna is moved spherical over the EUT in different polarizations of the antenna.

Final measurement:

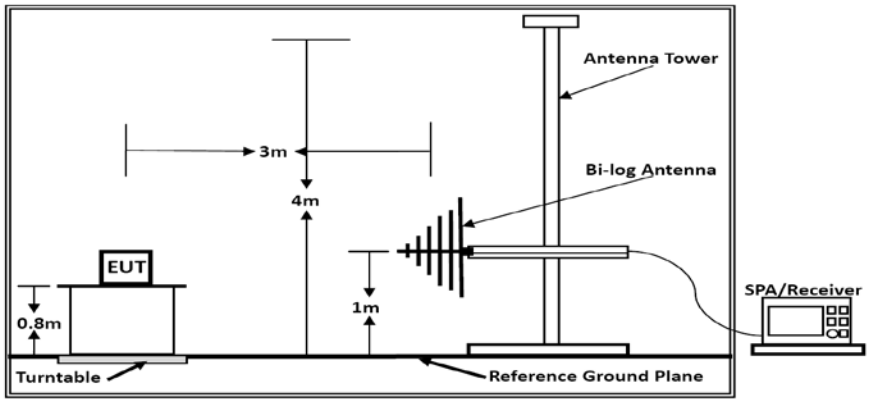
--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

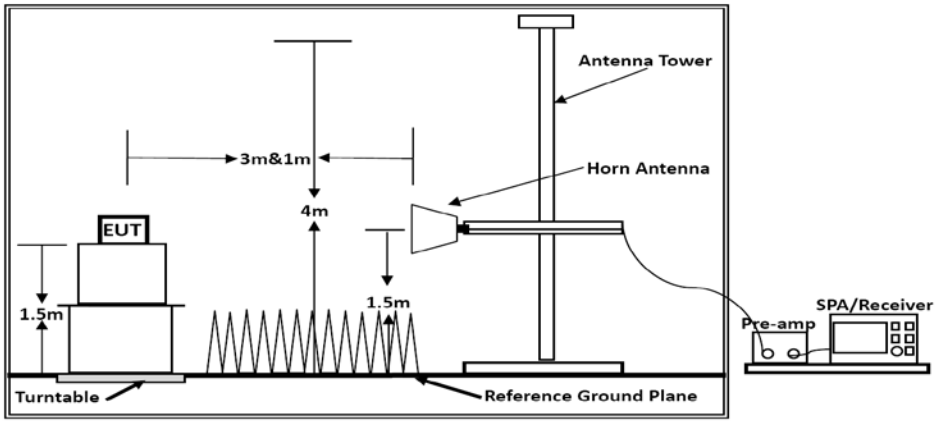
7.4. Block Diagram of Test Setup



Below 30MHz



Below 1GHz



Above 1GHz

Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1m.

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1.5m]) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

7.5 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

7.6. Test Results of Radiated Emissions (9 KHz~30 MHz)

Temperature	23.6℃	Humidity	52.8%
Test Engineer	Diamond Lu	Configurations	915 MHz

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Over Limit (dBuV)	Remark
-	-	-	-	See Note

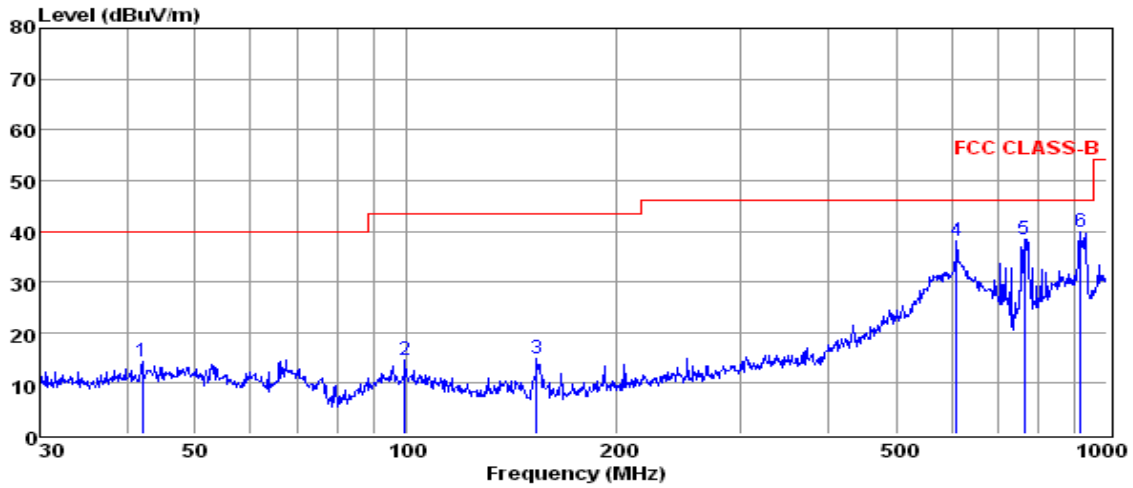
Note:
The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor.

7.7. Test Results of Radiated Emissions (30 MHz – 1000 MHz)

Temperature	23.9℃	Humidity	54.2%
Test Engineer	Tom Liu		

Field Strength of Fundamental					
Frequency (MHz)	Pol.	Measure Result (QP, dBuV/m)	QP Limit (dBuV/m)	Margin (dBuV/m)	Result
909	H	91.28	94.00	-2.72	PASS
909	V	89.11	94.00	-4.89	PASS
915	H	91.40	94.00	-2.60	PASS
915	V	92.26	94.00	-2.74	PASS
921	H	91.44	94.00	-2.56	PASS
921	V	91.33	94.00	-2.67	PASS

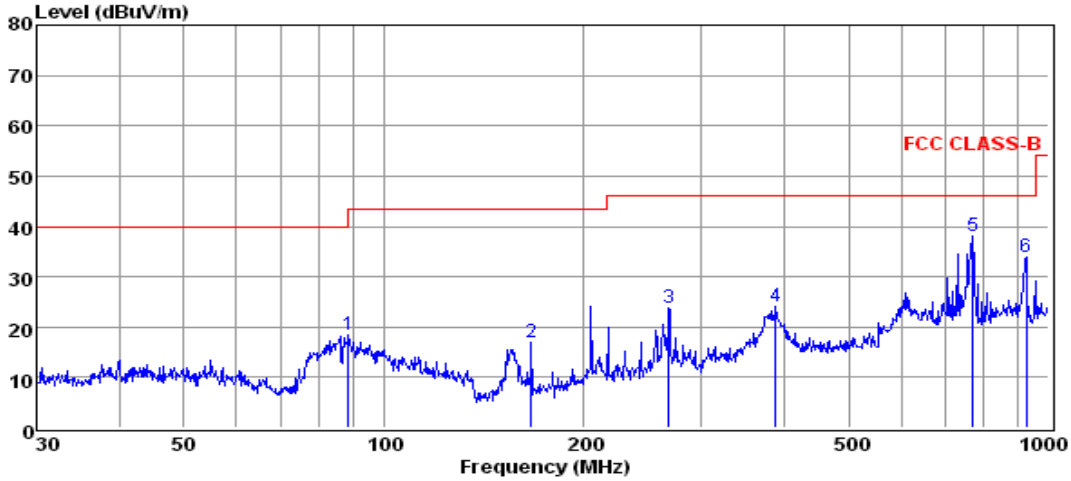
Horizontal



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	42.01	0.11	0.50	13.57	14.18	40.00	-25.82	QP
2	99.53	0.93	0.61	13.13	14.67	43.50	-28.83	QP
3	153.74	5.70	0.76	8.41	14.87	43.50	-28.63	QP
4	609.92	18.27	1.45	18.49	38.21	46.00	-7.79	QP
5	763.38	17.24	1.60	19.60	38.44	46.00	-7.56	QP
6	916.07	16.47	2.04	21.19	39.70	46.00	-6.30	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that are 20db below the official limit are not reported

Vertical



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	88.34	6.51	0.68	11.37	18.56	43.50	-24.94	QP
2	166.65	7.31	0.77	8.87	16.95	43.50	-26.55	QP
3	268.49	10.53	1.00	12.31	23.84	46.00	-22.16	QP
4	387.99	8.13	1.17	14.78	24.08	46.00	-21.92	QP
5	768.75	16.71	1.76	19.67	38.14	46.00	-7.86	QP
6	925.76	10.81	1.90	21.26	33.97	46.00	-12.03	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that are 20db below the official limit are not reported

****Note:*

1). Emission level (dBuV/m) = 20 log Emission level (uV/m).

2). Corrected Reading: Antenna Factor + Cable Loss + Read Level = Level.

3). Measured with 910-930 MHz filter in order to avoid spectrum overload.

7.8. Results for Radiated Emissions (1 – 10 GHz)

TX @ 909 MHz

Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
1818.00	53.11	33.06	35.04	2.14	53.27	74.00	-20.73	Peak	Horizontal
1818.00	34.13	33.06	35.04	2.14	34.29	54.00	-19.71	Average	Horizontal
1818.00	54.34	33.06	35.04	2.14	54.50	74.00	-19.50	Peak	Vertical
1818.00	36.30	33.06	35.04	2.14	36.46	54.00	-17.54	Average	Vertical
2727.00	53.99	33.11	35.09	2.72	54.73	74.00	-19.27	Peak	Horizontal
2727.00	35.69	33.11	35.09	2.72	36.43	54.00	-17.57	Average	Horizontal
2727.00	55.76	33.11	35.09	2.72	56.50	74.00	-17.50	Peak	Vertical
2727.00	36.62	33.11	35.09	2.72	37.36	54.00	-16.64	Average	Vertical
3636.00	52.92	33.03	35.07	3.12	54.00	74.00	-20.00	Peak	Horizontal
3636.00	35.26	33.03	35.07	3.12	36.34	54.00	-17.66	Average	Horizontal
3636.00	55.01	33.03	35.07	3.12	56.09	74.00	-17.91	Peak	Vertical
3636.00	37.88	33.03	35.07	3.12	38.96	54.00	-15.04	Average	Vertical
4545.00	52.18	33.26	35.14	3.98	54.28	74.00	-19.72	Peak	Horizontal
4545.00	35.99	33.26	35.14	3.98	38.09	54.00	-15.91	Average	Horizontal
4545.00	54.20	33.26	35.14	3.98	56.30	74.00	-17.70	Peak	Vertical
4545.00	37.13	33.26	35.14	3.98	39.23	54.00	-14.77	Average	Vertical

TX @ 915 MHz

Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
1830.00	53.78	33.06	35.04	2.14	53.94	74.00	-20.06	Peak	Horizontal
1830.00	34.20	33.06	35.04	2.14	34.36	54.00	-19.64	Average	Horizontal
1830.00	54.89	33.06	35.04	2.14	55.05	74.00	-18.95	Peak	Vertical
1830.00	37.70	33.06	35.04	2.14	37.86	54.00	-16.14	Average	Vertical
2745.00	53.05	33.11	35.09	2.72	53.79	74.00	-20.21	Peak	Horizontal
2745.00	34.93	33.11	35.09	2.72	35.67	54.00	-18.33	Average	Horizontal
2745.00	55.18	33.11	35.09	2.72	55.92	74.00	-18.08	Peak	Vertical
2745.00	37.96	33.11	35.09	2.72	38.70	54.00	-15.30	Average	Vertical
3660.00	53.13	33.03	35.07	3.12	54.21	74.00	-19.79	Peak	Horizontal
3660.00	35.50	33.03	35.07	3.12	36.58	54.00	-17.42	Average	Horizontal
3660.00	55.06	33.03	35.07	3.12	56.14	74.00	-17.86	Peak	Vertical
3660.00	36.36	33.03	35.07	3.12	37.44	54.00	-16.56	Average	Vertical
4575.00	53.87	33.26	35.14	3.98	55.97	74.00	-18.03	Peak	Horizontal
4575.00	34.97	33.26	35.14	3.98	37.07	54.00	-16.93	Average	Horizontal
4575.00	54.81	33.26	35.14	3.98	56.91	74.00	-17.09	Peak	Vertical
4575.00	37.73	33.26	35.14	3.98	39.83	54.00	-14.17	Average	Vertical

TX @ 921MHz

Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
1842.00	53.99	33.06	35.04	2.14	54.15	74.00	-19.85	Peak	Horizontal
1842.00	35.99	33.06	35.04	2.14	36.15	54.00	-17.85	Average	Horizontal
1842.00	55.94	33.06	35.04	2.14	56.10	74.00	-17.90	Peak	Vertical
1842.00	37.08	33.06	35.04	2.14	37.24	54.00	-16.76	Average	Vertical
2763.00	53.49	33.11	35.09	2.72	54.23	74.00	-19.77	Peak	Horizontal
2763.00	35.61	33.11	35.09	2.72	36.35	54.00	-17.65	Average	Horizontal
2763.00	54.33	33.11	35.09	2.72	55.07	74.00	-18.93	Peak	Vertical
2763.00	37.29	33.11	35.09	2.72	38.03	54.00	-15.97	Average	Vertical
3684.00	52.74	33.03	35.07	3.12	53.82	74.00	-20.18	Peak	Horizontal
3684.00	34.61	33.03	35.07	3.12	35.69	54.00	-18.31	Average	Horizontal
3684.00	54.03	33.03	35.07	3.12	55.11	74.00	-18.89	Peak	Vertical
3684.00	37.66	33.03	35.07	3.12	38.74	54.00	-15.26	Average	Vertical
4605.00	53.78	33.26	35.14	3.98	55.88	74.00	-18.12	Peak	Horizontal
4605.00	34.45	33.26	35.14	3.98	36.55	54.00	-17.45	Average	Horizontal
4605.00	55.69	33.26	35.14	3.98	57.79	74.00	-16.21	Peak	Vertical
4605.00	37.18	33.26	35.14	3.98	39.28	54.00	-14.72	Average	Vertical

Notes:

1). Measuring frequencies from 9 KHz - 10th harmonic (ex. 26GHz), No emission found between lowest internal used/generated frequency to 30 MHz.

2). Radiated emissions measured in frequency range from 9 KHz - 10th harmonic (ex. 26GHz) were made with an instrument using Peak detector mode.

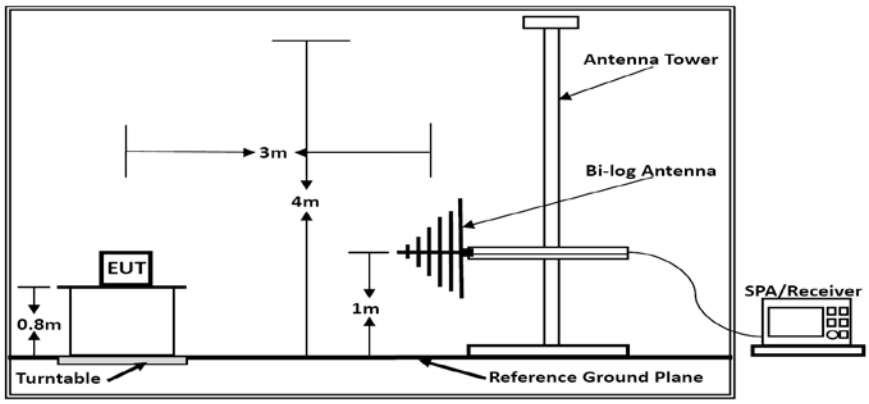
8. RESULTS FOR BAND EDGE TESTING

8.1. Standard Applicable

According to FCC §15.249 (d): Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

According to RSS-210 B.10 (b): Emissions radiated outside of the specified frequency bands, except for harmonic emissions, shall be attenuated by at least 50 dB below the level of the fundamental emissions or to the general field strength limits listed in RSS-Gen, whichever is less stringent.

8.2. Test Setup Layout



Below 1GHz

8.3. Measuring Instruments and Setting

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB/VB 200Hz/1KHz for QP/AVG
Start ~ Stop Frequency	150kHz~30MHz / RB/VB 9kHz/30KHz for QP/AVG
Start ~ Stop Frequency	30MHz~1000MHz / RB/VB 120kHz/1MHz for QP

8.4. Test Procedures

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 3 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

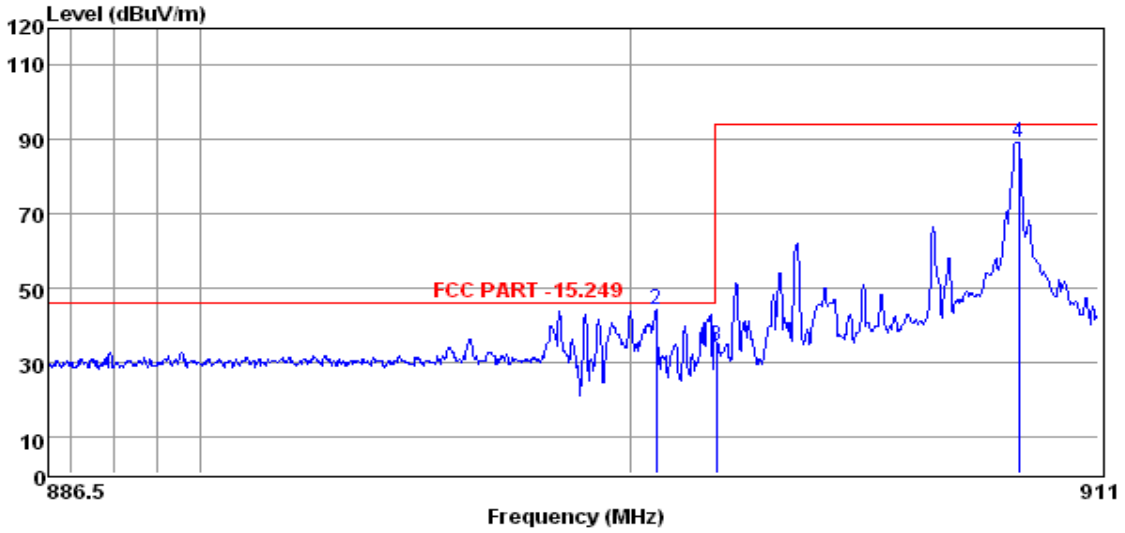
--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

8.5. Measuring Instruments and Setting

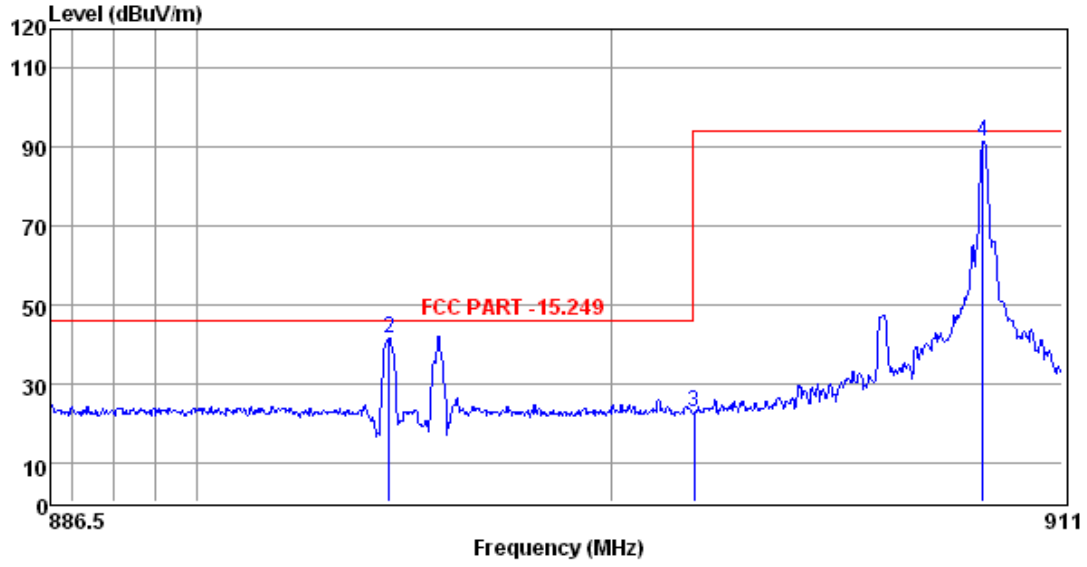
Horizontal



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	886.50	6.66	1.87	20.95	29.48	46.00	-16.52	QP
2	900.60	21.37	1.88	21.09	44.34	46.00	-1.66	QP
3	902.00	11.54	1.87	21.10	34.51	94.00	-59.49	QP
4	909.11	66.27	1.88	21.15	89.30	94.00	-4.70	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that are 20db below the official limit are not reported

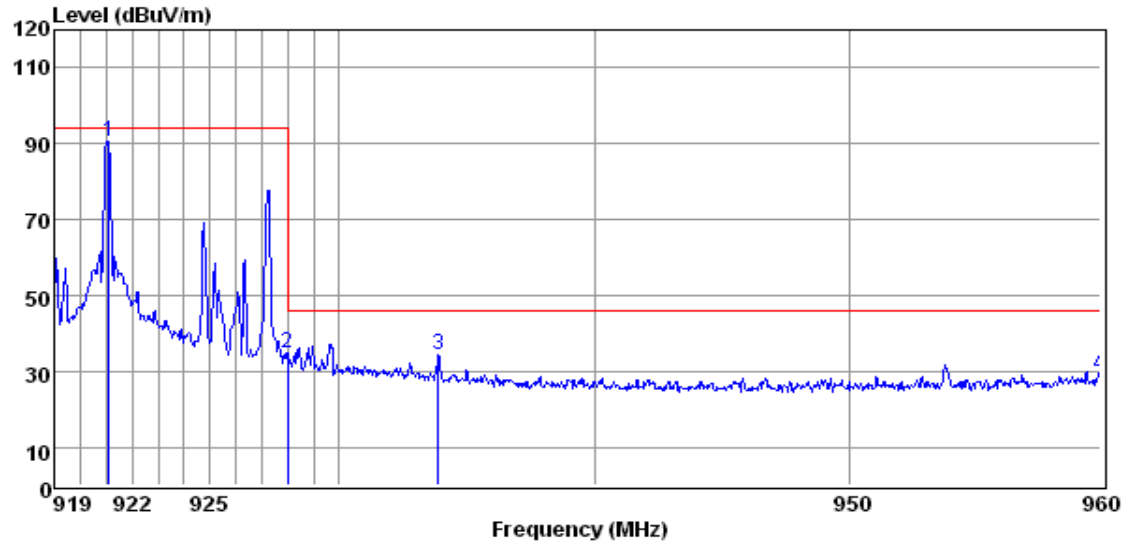
Vertical



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	886.50	1.03	1.87	20.95	23.85	46.00	-22.15	QP
2	894.63	18.68	1.84	21.03	41.55	46.00	-4.45	QP
3	902.00	-0.23	1.87	21.10	22.74	94.00	-71.26	QP
4	909.06	68.49	1.88	21.15	91.52	94.00	-2.48	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that are 20db below the official limit are not reported

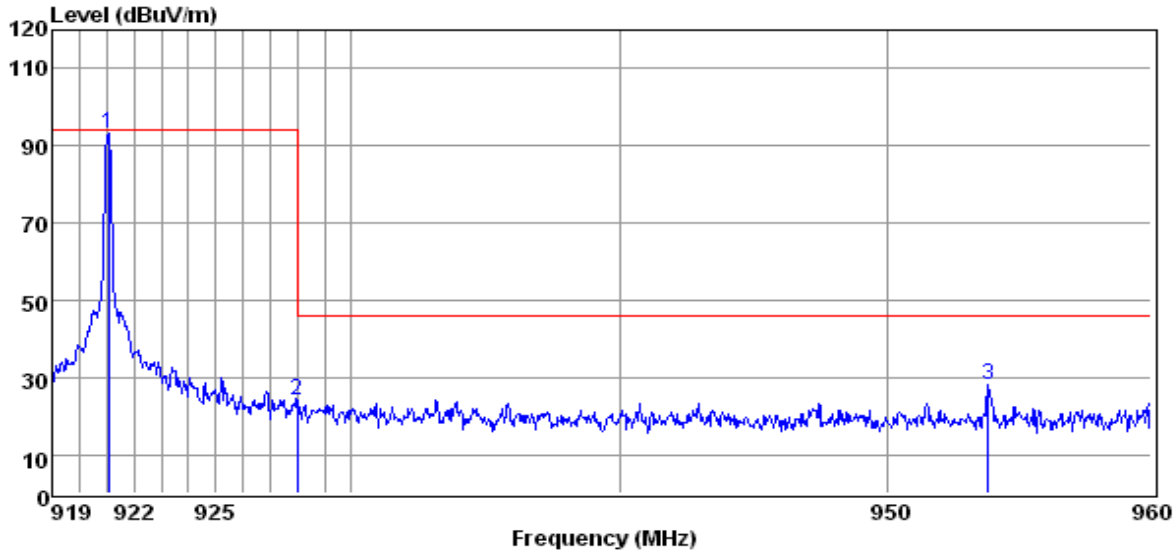
Horizontal



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	921.09	67.33	1.90	21.23	90.46	94.00	-3.54	QP
2	927.99	11.80	1.90	21.27	34.97	94.00	-59.03	QP
3	933.84	11.13	1.98	21.31	34.42	46.00	-11.58	QP
4	960.00	5.66	1.90	21.48	29.04	46.00	-16.96	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that are 20db below the official limit are not reported

Vertical



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	921.05	69.94	1.90	21.23	93.07	94.00	-0.93	QP
2	927.99	0.97	1.90	21.27	24.14	94.00	-69.86	QP
3	953.82	4.44	2.03	21.44	27.91	46.00	-18.09	QP
4	960.00	-4.96	1.90	21.48	18.42	46.00	-27.58	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that are 20db below the official limit are not reported

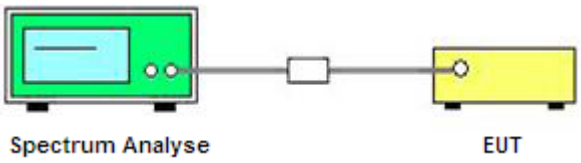
9. 99% OCCUPIED BANDWIDTH AND 20 DB BANDWIDTH MEASUREMENT

9.1. Standard Applicable

According to § 2.1049 and RSS-Gen section 6.7 “The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.”

In some cases, the “x dB bandwidth” is required, which is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated x dB below the maximum in band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.

9.2. Block Diagram of Test Setup



9.3. Test Procedure

Use the following spectrum analyzer settings:

Span = 500 KHz

RBW = 3 KHz

VBW = 10 KHz

Sweep = auto

Detector function = peak

Trace = max hold

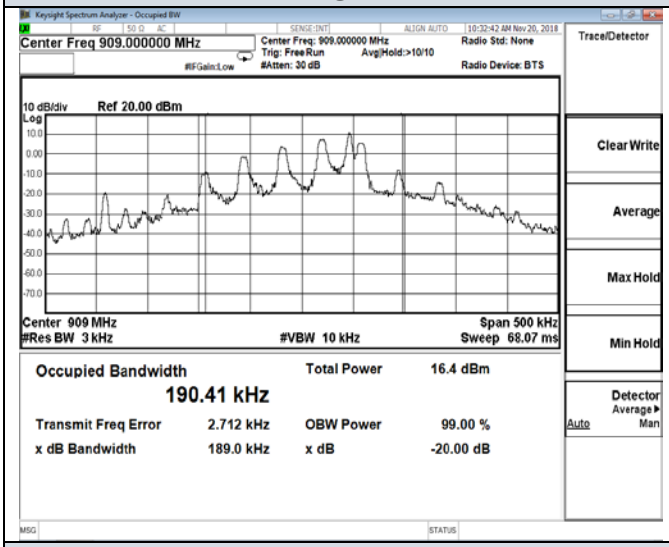
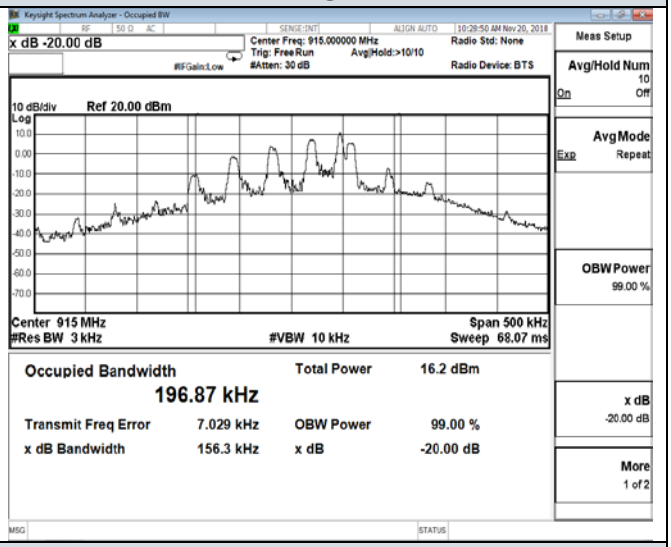
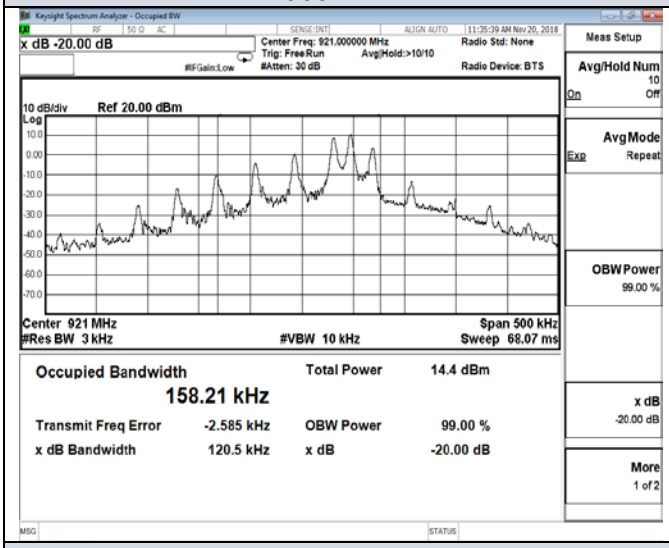
The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

9.4. Test Results

Test Result of 99% and 20dB Bandwidth Measurement			
Test Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (MHz)
909	189.00	190.41	Non-Specified
915	156.30	196.87	Non-Specified
921	120.50	158.21	Non-Specified

Remark:

1. *Test results including cable loss;*
2. *Please refer following test plots;*

20dB Bandwidth and 99% Bandwidth	
ASK	*ASK*
	
909 MHz	*915 MHz*
	
921 MHz	

10. LIST OF MEASURING EQUIPMENT

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	Power Meter	R&S	NRVS	100444	2018-06-16	2019-06-15
2	Power Sensor	R&S	NRV-Z81	100458	2018-06-16	2019-06-15
3	Power Sensor	R&S	NRV-Z32	10057	2018-06-16	2019-06-15
4	ESA-E SERIES SPECTRUM ANALYZER	Agilent	E4407B	MY41440754	2018-11-16	2019-11-15
5	MXA Signal Analyzer	Agilent	N9020A	MY49100040	2018-06-16	2019-06-15
6	SPECTRUM ANALYZER	R&S	FSP	100503	2018-06-16	2019-06-15
7	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2018-06-16	2019-06-15
8	Positioning Controller	MF	MF-7082	/	2018-06-16	2019-06-15
9	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
10	EMI Test Receiver	R&S	ESR 7	101181	2018-06-16	2019-06-15
11	AMPLIFIER	QuieTek	QTK-A2525G	CHM10809065	2018-11-16	2019-11-15
12	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2018-06-22	2019-06-21
13	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-05-02	2019-05-01
14	Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1925	2018-07-02	2019-07-01
15	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2018-09-20	2019-09-19
16	Broadband Preamplifier	SCHWARZBECK	BBV 9719	9719-025	2018-09-20	2019-09-19
17	RF Cable-R03m	Jye Bao	RG142	CB021	2018-06-16	2019-06-15
18	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2018-06-16	2019-06-15
19	TEST RECEIVER	R&S	ESCI	101142	2018-06-16	2019-06-15
20	RF Cable-CON	UTIFLEX	3102-26886-4	CB049	2018-06-16	2019-06-15
21	10dB Attenuator	SCHWARZBECK	MTS-IMP136	261115-001-0032	2018-06-16	2019-06-15
22	Artificial Mains	R&S	ENV216	101288	2018-06-16	2019-06-15
23	RF Control Unit	JS Tonscend Corporation	JS0806-2	178060073	2018-10-27	2019-10-26
24	JS1120-3 BT/WIFI Test Software	JS Tonscend Corporation	JS1120-3	/	N/A	N/A
Note: All equipment is calibrated through GUANGZHOU LISAI CALIBRATION AND TEST CO.,LTD.						

11. TEST SETUP PHOTOGRAPHS OF THE EUT

Please refer to separated files for Test Setup Photos of the EUT.

12. EXTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for External Photos of the EUT.

13. INTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for Internal Photos of the EUT.

----------THE END OF REPORT----------